# The Learning Impact of a Virtual Learning Environment: Students' views

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**Abstract**
Virtual learning environments (VLEs) are widely used in education, in many sectors, typically to deliver instructional materials and facilitate communication. This article reports on an online survey into VLE use by 248 second year students at an English Sixth Form College (SFC). The survey investigated the reported impact of using the college's VLE (Moodle) on learning, and was based on three research questions which investigated: whether the use of a VLE has a positive impact on student learning; whether the use of a VLE in teaching and learning helps develop independent learning; and whether the use of a VLE increases students' motivation to learn. The statistically significant findings report that the use of Moodle produces improvement in learning and motivation to learn as reported by the student participants. The findings will be of broad interest to teachers as they indicate areas for attention in promoting VLE use to enhance learning.

**Keywords**
Virtual learning environments; student view / voice; motivation; independent learning.

## Introduction

A Virtual Learning Environment (VLE) is a web based software system designed to facilitate learning and teaching with the use of tools and activities (JISC, 2009a). Students using a VLE can be set a 'task' to complete in class or at their own pace, time and location, they can contribute to synchronous and asynchronous discussions to help develop their learning (JISC, 2009b). Empirical evidence suggests that the use of a Virtual Learning Environment (VLE) has an impact on student achievement, encourages independent learning and increases students' motivation to learn (JISC, 2008). This article reports a study within a particular context, an English sixth form college (SFC), further testing hypotheses related to these claims in a positivistic manner. This study provides a snapshot of students' views about the use of the VLE and its impact on their learning, from which there are recommendations for teachers and teacher educators.

## VLE use literature review

This literature review outlines the background and development of VLEs to support teaching and learning. It starts with a brief historical background followed by general positive and then negative impacts of VLE use. The last section examines specific impacts of VLEs on independent learning and

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motivation. Each section, after the background, relates to the research questions and provides context for this work.

*Historical background on the use and development of VLEs*
It is difficult to define exactly how long VLEs have been in use. The UK's Open University has been utilising computers for learning since the 1970s but it was in 2000 that the commercial computer based VLE 'Blackboard' was patented. By 2010 Blackboard software was used by over 3700 educational institutions in more than 60 countries (Blackboard, 2011). The other most popular VLE, 'Moodle', was introduced in 2001, (Ofsted, 2009). It was originally developed to help educators create online courses with a focus on interaction and collaborative construction of content (Ofsted, 2009) and by 2011, Moodle had a user base in 212 countries with 49,365 active sites in more than 75 languages (Moodle, 2011). In the UK within the post-compulsory sector in 2008-9, 92% of further education colleges had a virtual learning environment; the figure having risen from 58% in 2003-04 (Sero, 2009).

As a result of the UK Government 2005 strategy paper *Harnessing Technology – transforming learning and children's services,* which emphasised institutions and learning providers making more effective use of technology (Becta, 2010), Ofsted reported on a sample of 34 schools investigating the impact of VLEs on students' learning (Becta, 2009). The reports were published between September 2005 and December 2007 and concluded that just over half of the schools surveyed were positive about the impact of VLEs on learning and teaching. In contrast, during the same period 58 FE colleges out of 281 inspected by Ofsted had a VLE and of those three quarters suggested that the use of VLEs were helping learners (Becta, 2009).

In a further report into FE colleges (n=25) Ofsted (2009) found frequently that the VLE was still primarily used as a repository for teaching materials and sometimes utilised for assignment uploading with limited use of interactive functions. Less than a quarter of the colleges were using the VLE to support independent learning, however, those that did were confident that technology had contributed to creative teaching providing learners' with access to relevant content; and giving flexibility to delivery. Colleges were less sure about impacts on learner attainment, progression and retention (National Institute of Adult Continuing Education (NIACE), 2009).

*General positive impacts of VLEs*
Positive impacts of the use of VLEs on student learning are supported by a study (Scardamalia & Bereiter, 1996) in West Virginia, USA. Upper-grade elementary students used a software collaboration tool that enables students and teachers to communicate online to develop their understanding and analytical skills. Students performed significantly better on standardised tests in reading, language and vocabulary and on measures of depth of understanding, multiple perspectives and independent thought than students who did not use the software (Scardamalia & Bereiter, 1996). The study concluded that VLEs maximise student reflection and encourage progressive thought, and independent thinking. This research was one of seven empirical research studies

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across West Virginia which concluded that students with access to one or more of the following; computer assisted instruction, integrated learning systems, simulation software, collaborative networked technologies and design and programming technologies all showed positive gains in achievement on researcher constructed tests, standardised tests, and national tests (Schacter, 1999).

In research conducted in a higher education context into VLE use, Wernet, Olliges and Delicath (2000) surveyed two groups (one undergraduate and one graduate) of social work students (n=39). The research investigated whether computer-dependent technology-based instruction disadvantaged women, and older non-traditional adults. Statistically significant results showed that graduate students were more likely to access their course from home whilst undergraduate students reported more enthusiasm about the use of technology for learning. The research concluded that the use of a VLE accommodates the needs of non-traditional students in social work education and that students' VLE satisfaction was dependent upon utility, exposure and access; the usefulness of the technology; and the tools used (Wernet *el al.,* 2000).

Wernet *et al*.'s findings were supported by subsequent research undertaken by Diochon and Cameron (2001) who constructed a research project based on undergraduate business students learning material accessible only by VLE. They found that the necessity to be active learners when using a VLE, increased students enthusiasm, confidence and capacity. Students created their own knowledge through collaborative experiences with peers in other locations providing an opportunity to develop graduate employability skills and competencies (Diochon & Cameron, 2001).

In another higher education study Downing & Chim, (2004) examined data related to student and tutor usage of an asynchronous discussion during a first-semester course in applied psychology at the City University of Hong Kong. Their findings suggest that classroom-based 'introverts' behave more like 'extraverts' when involved in online discussion forums and are consequently more active in online discussions than classroom ones. Further research by Rogers (2004) supports the findings of Downing & Chim. Rogers examined the impact of WebCT on university history students (n = 16) to establish whether claims that educational technology can enhance the quality of learning and cognitive achievement. 79% of students asserted that learning via the VLE made a positive difference to studying and that they understood more, yet 28% also expressed a preference for traditional teaching methods.

In 2008, as a result of the UK Government's 2005 strategy paper, Ofsted evaluated the development of VLEs in a sample of educational settings. This resulted in an Ofsted publication *Virtual learning environments: an evaluation of their development in a sample of educational settings* (Ofsted, 2009). Ofsted visited 41 providers, including 18 colleges, six primary and two secondary schools. Inspectors found that in all the environments the concept of VLEs was relatively new; colleges were making the most use and primary schools the least. In the best practice VLEs were found to enhance learning particularly via

the opportunity for reinforcement and to enable students to 'catch up' on missed material. Over three quarters of the VLEs examined had elements that were good, but subject use and coverage within institutions was variable (Ofsted, 2009). Little use was made of interactive tools such as forums and other discussion facilities. Success with the use of VLEs appeared to be linked to the enthusiasm of individual teachers to use technology (Ofsted, 2009). Ofsted identified that access to broadband internet from a student's home and staff training / development time were key factors in the effectiveness of VLEs. As a result of the survey Ofsted recommended that VLEs be used to enhance learning and should not be used as just storage or communication facilities. They suggested that VLE specific quality assurance strategies and self assessment should be formalised in institutions in order to assess impact and improve effectiveness (Ofsted, 2009). In the following year the British Educational Communications and Technology Agency (Becta), updated *The big pICTure: The Impact of ICT on Attainment, Motivation and Learning*. The report concluded that classes with an online learning element achieved more learning outcomes than face-to-face classes. The report suggests two key areas of impact; firstly, readiness for learning and secondly, integration of learners into the educational process via flexible access to resources (Becta, 2009). In the same year Means, Toyama, Murphy, Bakia & Jones (2009) conducted a meta-analysis of online learning studies for the US Department of Education. The overall finding was that students in classes with online learning (taught completely online or blended) on average learnt more than students in classes with solely face-to-face instruction. One year later Jewitt, *et al*. (2010) examined, for Becta, the use of VLEs in 12 schools, identifying 12 areas of benefit arising from effective use. The top three benefits were reported to be; improved organisation of information and communication across the school; greater parental involvement, through being better informed, and enhanced supporting of learning at home; and increased pupil opportunities for independent and personalised learning (p.6). The last of these was also reported by Jewitt *et al*. in 2011 to be effective because it provided, amongst other things 'increased student choice and autonomy' (p.8).

In summary, VLEs have a range of research reported positive impacts form various contexts. They can; promote reflection, accommodate the needs of students, increase enthusiasm and confidence, improved readiness to learn, and broadly reported above improved course assessment performance.

*General negative impacts of VLEs*

Crook, (2000); Seabolt & Arends, (2000) and Muirhead, (2001), all express the view that web-based instruction does not allow for the social and emotional interaction that takes place in traditional classrooms. In 2001 Piccoli, Ahmad, & Ives compared, using a longitudinal experimental design, classes taught using VLEs with traditional teacher-led classes. They found no significant differences in learning performance between the environments. However, the participants in the VLE group reported being less satisfied with the learning process. Robertson and Klotz (2002) agree and assert that students in an online learning environment lack the opportunity and benefits of structured dialogue and the sense of community created in a traditional on-site classroom environment.

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A JISC (2007) survey of higher education learners carried out for the study, *In Their Own Words,* explored the learner experience. Two reports were produced; *The Learner Experience of e-Learning* study, (LEX), (Creanor *et al.,* 2006) and *Student Experiences of Technologies* study, (LXP), (Conole *et al.,* 2006). The LXP study, explores differences between subject disciplines in the uses of technology. Four Higher Education Academy subject centres: Medicine, Dentistry and Veterinary Medicine; Economics; Information and Computer Sciences, and Languages and Linguistics were researched. The study comprised both quantitative and qualitative methodologies and was based on a survey of over 400 learners, 85 audio logs and 14 follow-up interviews. The research identifies how learners' study habits are changing, from prioritising use of the internet for information retrieval to incorporating personally owned tools and technologies e.g. laptops and mobile phones, (Conole *et al.,* 2006). The research concludes that VLEs are often used for passive rather than active learning and a significant number of respondents listed discussion boards as one of the least used technologies.

Recently in a study of school teachers (n=86) in the UK (Read, Coles, Frey & Littlefield, 2013) showed that VLE use was broadly limited to use as a work repository, a facility for setting homework and sharing sites with the students with very few staff utilising the collaborative learning tools. Staff time for training was cited as the main reason. Although this study does not deal directly with students' experiences it does offer some insight into why VLEs can negatively impact on learning. Finally, Demian & Morrice (2012) reported an analysis of HE student academic performance on two final year undergraduate modules. For 'one the VLE has very little effect on students' academic performance … but [for the other] a moderate effect on their performance in' (p.17). However, neither of these effects were statistically significant.

The preceding section has addressed RQ1; 'Does the use of a VLE have a positive (or negative) impact on student learning'? It can be concluded that evidence is contradictory and contingent. The next section considers the limited empirical research with regard to RQ2 'Does the use of a VLE in teaching and learning help develop independent learning'? And RQ3, 'Does the use of a VLE for teaching and learning increase students' motivation to learn'?

*Impact of VLEs on Independent Learning and Students' Motivation to learn*

In 1990 Hiltz reported on a study in New Jersey with data collected, via pre and post course questionnaires, from a total of 132 high school students undertaking online courses, 96 in mixed-mode courses and 89 in traditional classroom settings. The evaluation goals of the project were: to describe the nature of the educational experiences and outcomes comparing a VLE to the traditional classroom, and determine those conditions associated with good or poor outcomes. The survey reported that 55% of respondents agreed that their motivation was increased because other students read their posted comments, 56% agreed that they felt more involved in taking an active part in the course through collaborative tools such as forums and 65% considered online courses to be more convenient. The word 'fun' was frequently used by those students who reported high levels of interest and involvement. Findings were supported by

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subsequent research which suggests that the teacher-student interaction is the critical factor in fostering both a sense of competence and student autonomy leading to increased motivation and independence (Deci & Ryan, 2000; Seifert & O'Keefe, 2001).

In a report for the Open University, UK, *Motivation and mobile devices*, Jones and Issroff (2006) propose six reasons for why using a VLE might be motivating for students:

- Control over learning - students can define the tasks and activities they wish to engage in, they take responsibility for their learning.
- Ownership - increased access to technologies has encouraged widening participation. The opportunity to learn informally at a time, place and pace to suit is highly motivating.
- Learning-in-context – the opportunity to access resources and information in the relevant context with the ability to share it with others.
- Continuity between contexts – VLEs offer increased opportunities for formative assessment and feedback leading to benefits in terms of retention and achievement.
- Fun - learning online can be associated with 'fun'.
- Communication - communication and collaborative learning, such as the use of forums, chat and email for discussion and feedback. Crook (2000) suggests that working with other people, given the right conditions, is in itself motivating.

*Conclusion*

Empirical research underpins the research questions and partially supports the stated hypotheses. Evidence suggests, but is inconclusive, that the use of a VLE has an impact on student achievement, that the use of a VLE encourages independent learning, and that the use of a VLE increases students' motivation to learn. However, none of the available research considered a UK sixth form college setting. The following section reports a quantitative survey conducted to gather data to test these hypotheses in such a context.

## Research design and methods

The quantitative research was carried out in the form of an e-questionnaire (Survey Monkey) allowing analysis with Excel. The questions were organised and grouped around the three research questions below (appendix one). All 650 second year students at SFC were invited to complete the survey. The survey was promoted during group tutorials and students were invited to complete it in their own time. To establish a minimum representative sample a sample size calculation was conducted (confidence level 95%). In order to generate representative results a response rate of 37% was required a minimum sample size of 242.

Three research questions (RQ) were posed.

RQ1. Does the use of a VLE have a positive impact on student learning?
RQ2. Does the use of a VLE in learning and teaching help develop student independent learning?

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RQ3. Does the use of a VLE for learning and teaching increase students' motivation to learn?

Each question was rephrased to form a testable hypothesis (followed here by the null hypothesis).

$H_1$- The use of a VLE does have a positive impact on student learning ($H_0$ – The use of a VLE does not have a positive impact on student learning).
$H_2$-The use of a VLE helps to develop student independent learning ($H_0$ – The use of a VLE does not help to develop independent learning).
$H_3$-The use of a VLE for teaching and learning increases students' motivation to learn ($H_0$ – The use of a VLE for teaching and learning does not increase students' motivation to learn).

Before the survey went 'live' an online pilot was conducted with a randomly selected first year tutor group. As a result the wording of one question was amended. The questionnaire was constructed in two sections. The first, questions 1 to 5, utilised closed, multiple choice questions that asked the respondents about their use of Moodle. The second, questions 6, 7 and 8, asked closed questions linked to the topics of the three RQs. Each questions consisted of four sub-questions to which respondents selected a point on a Likert scale. (Strongly Disagree - 1, Disagree - 2, Neither agree nor disagree - 3, Agree - 4 and Strongly Agree - 5). An overall score was calculated for each question, 6, 7 and 8 respectively from the sum of the four sub-questions. The neutral response i.e. 'neither agree nor disagree' was rated 3 therefore any aggregated value in the results higher than neutral (3), e.g. 3.4, denotes extent of agreement.

All questionnaire results were anonymous and students were informed of this before completing the survey. An information sheet was given to the students during tutorial time and was available on the SFC VLE. Survey completion was taken as informed consent for data to be used in the study. The survey was 'open' for completion for two weeks and the group tutors were asked to encourage completion to ensure a sufficiently large sample was obtained.

**Data presentation, analysis and discussion**

During the two weeks 248 useable questionnaires were completed (155 females and 93 males) representing a 38% response rate from a cohort of 650 second year students. Of these respondents 75.8% accessed the VLE without any problems, 20.6% with 'some' problems and 3.6% had not tried to access Moodle. With regard to the use of SFC Moodle as an integrated part of student learning, 43.2% of respondents (63 female and 32 male) use Moodle to a small extent and 35.9% of respondents (49 female and 30 male) use Moodle to a large extent. A relatively small figure of 4.1 % did not use Moodle at all. 13.6% used Moodle to a very small extent, whilst conversely 3.2% use Moodle to a very large extent.

*Data to address study hypotheses*

In the following section each of the research questions is addressed. Table one (below) presents the overall results for the question 'Does the use of a VLE have a positive impact on student learning?' (RQ1). The mean of all four questions

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was calculated with all reported values above 3.0, the mid-point on the scale. Aggregated statement responses indicate that 53% of respondents either 'agree' or 'strongly agree' that the use of SFC Moodle has a positive effect on their achievement with only 16% of respondents 'disagreeing' or 'strongly disagreeing'.

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**Table 1.** To what extent do you agree or disagree with the following statements that use of SFC Moodle has a positive impact on your achievement? (Question 8).

| Answer Options | Strongly Disagree | Disagree | Neither agree or disagree | Agree | Strongly Agree | Mean Score |
|---|---|---|---|---|---|---|
| 8a. Moodle has a positive impact on my effectiveness as a student. | (13) 5.2% | (22) 8.9 | (71) 28.6% | (123) 49.6 % | (19) 7.7% | 3.46 |
| b. Moodle is an important and valuable aid to me in my studies. | (16) 6.5% | (16) 6.5% | (71) 28.6% | (120) 48.4 % | (25) 10.1% | 3.49 |
| c. I learn more with Moodle than without it. | (18) 7.3% | (34) 13.7% | (72) 29.0% | (107) 43.1 % | (17) 6.9% | 3.29 |
| d. Moodle improves the quality of my learning. | (13) 5.2% | (26) 10.5% | (88) 35.5% | (109) 44.0 | (12) 4.8% | 3.33 |
| Total Respondents as Percentage of response count | 6% | 10% | 31% | 46% | 7% | |

(Figures in brackets are actual numbers of respondents)

Table 2. (overleaf) presents the overall results for the question 'Does the use of a VLE in teaching and learning help develop independent learning?' (RQ2). Of the respondents 66.9% 'agree' or 'strongly agree' that the opportunity to learn using Moodle at a time, place and pace to suit oneself encourages independent learning, 57.7% 'agree' or 'strongly agree' with the statement that courses at SFC are set up in such a way that they encourage independent learning, 73.8% 'agree' or 'strongly agree' that resources on Moodle are mainly for information purposes. Only 24.6% of students 'agree' or 'strongly agree' that activities on Moodle encourage communication between students. Question 6d has a mean score of 2.63; below neutral (3.0) indicating respondent disagreement with the statement that Moodle encourages between student conversations about work. The mean response score for the other statements all fall to the 'agree' side of neutral. Aggregated statement responses indicate that 55% of respondents either 'agree' or 'strongly agree' that the use of SFC Moodle encourages independent Learning. However, it should be highlighted that for 6c this shows a high information repository use of Moodle.

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**Table 2.** To what extent do you agree or disagree with the following statements about the use of SFC Moodle to encourage Independent Learning (Question 6).

| Answer Options | Strongly Disagree | Disagree | Neither agree or disagree | Agree | Strongly Agree | Mean Score |
|---|---|---|---|---|---|---|
| 6a. The opportunity to learn using Moodle at a time, place and pace to suit myself encourages me to learn independently. | (8) 3.2% | (13) 5.2% | (61) 24.6% | (133) 53.6 % | (33) 13.3% | 3.69 |
| 6b. The way in which subject/courses are set up encourages me to learn independently. | (9) 3.6% | (19) 7.7% | (77) 31.0% | (127) 51.2 % | (16) 6.5% | 3.49 |
| 6c. Generally for my subjects the resources for me on Moodle are mainly for information purposes. | (8) 3.2% | (14) 5.6% | (43) 17.3% | (155) 62.5 % | (28) 11.3% | 3.73 |
| 6d. Generally for my subjects the activities on Moodle encourage me to talk to other students about the work. | (39) 15.7% | (80) 32.3% | (68) 27.4% | (55) 22.2 % | (6) 2.4% | 2.63 |
| Total Respondents as Percentage of response count | 7% | 13% | 25% | 47% | 8% | |

(Figures in brackets are actual numbers of respondents)

The results for the question 'Does the use of a VLE for teaching and learning increase students' motivation to learn'? (RQ3) were as follows. Of the respondents 46.8% 'agree' or 'strongly agree' that being in control of learning, learning at a time, place and pace, increases motivation to learn, 49.5% 'agree' or 'strongly agree' that the variety of course tools available on Moodle increase students' motivation to learn, 35.5% 'agree' or 'strongly agree' that the variety of formats available on SFC Moodle increase students' motivation to learn and 40.3% 'agree' or 'strongly agree' that feedback on activities increase students' motivation to learn. The mean response score for all four questions was to the 'agree' side of neutral and aggregated statement responses indicate that 43% of students either 'agree' or 'strongly agree' that the use of SFC Moodle increases motivation to learn with 22% 'disagreeing' or 'strongly disagreeing'.

Each of the three research questions was cross tabulated (and chi-squared tests conducted) with five other questions about VLE use (see table three below). The chi-squared test reports the statistical likelihood of the relationship occurring by chance (Saunders et al, 1997) and the test is based on a comparison of the

observed values collected with what might be expected if the two distributions were independent of each other. In all cases in table three where a significant chi-squared statistic was returned (above 0.05 95% *, 0.01 99% **, 0.001 99.9% ***) the ***possible*** impact nature of the association (from the cross tabulation) is presented.

**Table 3a.** Chi-square test results for RQ1.

| RQ1: Does the use of SFC Moodle have a positive impact on student?<br>Analysis of questionnaire question 8 (Moodle has a positive impact on my effectiveness as a student): | | |
|---|---|---|
| Moodle has positive impact on effectiveness | Positive impact | *** |
| Analysis of questionnaire question 8 (Moodle has a positive impact on my effectiveness as a student) in relation to: | | |
| Sex | No association | |
| Access to Moodle from home | Positive impact | *** |
| Directed use of Moodle | Positive impact | *** |
| Non-directed use of Moodle | Positive impact | *** |

**Table 3b.** Chi-square test results for RQ2.

| RQ2: Does the use of a VLE in teaching and learning help develop student independent learning?<br>Analysis of questionnaire question 6 (The opportunity to learn using Moodle at a time, place and pace to suit myself encourages me to learn independently): | | |
|---|---|---|
| Opportunity to learn using Moodle … encourages me to learn independently | Aids development of independent learning | *** |
| Analysis of questionnaire question 6 (The opportunity to learn using Moodle at a time, place and pace to suit myself encourages me to learn independently) in relation to: | | |
| Sex | No association | |
| Access to Moodle from home | Aids development of independent learning | *** |
| Directed use of Moodle | Aids development of independent learning | *** |
| Non-directed use of Moodle | Aids development of independent learning | *** |

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**Table 3c.** Chi-square results for RQ3.

| | | |
|---|---|---|
| RQ3. Does the use of a VLE for teaching and learning increase students' motivation to learn?<br>Analysis of questionnaire question 7 (The opportunity to be in control of my learning via Moodle and learn at a time, place and pace, increases my motivation to learn): | | |
| Opportunity to be in control of my learning via Moodle … increases my motivation to learn | Increases motivation to learn | *** |
| Analysis of questionnaire question 7 (The opportunity to be in control of my learning via Moodle and learn at a time, place and pace, increases my motivation to learn):in relation to: | | |
| Sex | No association | |
| Access to Moodle from home | Increases motivation to learn | *** |
| Directed use of Moodle | Increases motivation to learn | *** |
| Non-directed use of Moodle | Increases motivation to learn | *** |

**Concluding thoughts**

Empirical research reported in the literature underpins the research questions and leads to the development of the hypotheses. This data confirms that use of a VLE encourages independent learning with the opportunity to learn informally at a time, place and pace to suit the learner providing flexibility for students to fit course work around busy lives (see JISC, 2007). The literature review also provides evidence that the use of a VLE increases students' motivation to learn, promotes communication and collaborative learning, via the use of forums, chat and email for discussion and that the direct feedback is highly motivating. (JISC, 2009b).

For RQ1, the data suggest that the use of a VLE has a positive impact on student learning. The composite score for question 8 reports that 53% of respondents either agree or strongly agree that the use of SFC Moodle has a positive impact on learning. For RQ2, the data suggest that the use of a VLE helps the development of independent learning. The composite score for question 6 reports that 55% of respondents either agree or strongly agree that the use of SFC Moodle helps to develop independent learning. For RQ3, the data suggest that the use of a VLE for learning and teaching increases students' motivation to learn. The composite score for question 7 reports that 43% of respondents either agree or strongly agree that the use of SFC Moodle increases motivation to learn.

Vygotsky (1978) emphasised that conceptual learning was a collaborative effort that required supportive dialogue, so it is reasonable to assume that online discussion via a VLE has the potential to enhance both collaboration and concept development. As suggested in the literature review it would appear however, that it is the collaboration tools for example forums, which are least utilised and require further development and implementation in order to have a positive

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impact on learning. Analysis of question 6c and 6d support this view. Only 24.6% of respondents agree or strongly agree that activities on Moodle encourage collaboration. Probably because it was not utilised for these purposes rather than it did not encourage collaboration per se. The response to 6d illustrates that the collaborative tools available in Moodle e.g. Chat and Forums, which are considered important tools for developing independent learning, are either not available or are not used appropriately by staff. There is perhaps a key development role for teacher educators to play here.

In a study of Internet-based MBA courses Arbaugh (2000) found that perceived usefulness and flexibility of a VLE were positively associated with student satisfaction with a course. From the learning perspective, a VLE can provide opportunities for practice and recall and accommodate a wide range of learning materials and formats e.g. multimedia (JISC, 2009b). Analysis of question 7b regarding the variety of course tools, for example, news feeds and quizzes supports Arbaugh's view with 49.5% of respondents either agreeing or strongly agreeing that the variety of course tools increased their motivation to learn. However, only 35.5% of respondents agreed or strongly agreed that the variety of formats (e.g. audio clips and podcasts) increased their motivation to learn. Nevertheless 46.8% of respondents agreed or strongly agreed that flexibility of time, place and pace increased their motivation to learn. The opportunity to be in control of learning and learn at a time and place of choice was also a key factor in developing independent learning with 66.9% of respondents agreeing or strongly agreeing that such flexibility encourages independent learning.

Empirical research cited, suggests that the use of VLEs results in improvements in learning and teaching which lead to improved satisfaction, retention and achievement for a larger and more diverse student body. This study suggests that tasks on a VLE and the opportunity to learn at a personally defined place, time and pace encourages students to take a level of ownership for their learning which increases their independence and motivation to learn. The research in the literature also shows that the potential of VLEs depends on addressing the pedagogic issues associated with effective learning and ultimately on the overall quality of course design and learner support. Boud (1981, cited in Rogers, 2004, p.245) highlights a vital point that "ultimately, it is only the decisions which learners make about what they will or will not do which actually influence the outcomes of learning." Students need to take responsibility for their learning to ensure successful outcomes. Ghurbhurun (2007, cited in Carter, 2008, p5) claims that "we've reached the tipping point in the use of e-learning and technology" and suggests that we have yet to discover the profound impact that such technologies may have on delivering a dynamic curriculum.

Whilst this study suggests that using SFC Moodle has a positive impact on student learning, it would have been interesting to establish if subject disciplines have differing impacts on learning. Equally it would be interesting to research which of the tools in the VLE for example, forums, quizzes, course handouts, have the greatest impact on student learning. This study has limitations due to the time available and the positivistic approach taken, however, the statistical analysis returned significant results but does not, and nor can it, provide depth.

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Further work, exploring in a naturalistic, inductive way, might be conducted with staff and students to uncover how VLE use might be more effective in motivating, engaging and increasing positive impact on learning.

From this research we feel it is possible to make some management recommendations about the use of a VLE. Because of the statistical significance reported, although we recognise the post-positivistic nature of this work and its time boundedness, it is arguable that these recommendations could be generalised to similar educational settings.

- Provide staff CPD in the use and development of the VLE.
- Wherever possible steps should be taken to ensure that all students have access to the VLE from home.
- Consider minimum requirements for directed use of a VLE by students.
- Implement strategies to encourage non-directed use of a VLE.
- Provide opportunities and flexibility to allow students to be in control of their learning using a VLE.
- Ensure that VLE use is interactive and not restricted to a role as an information repository.

The last four of these are also relevant for teacher educators to consider as questions to pose to their student-teachers.

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## Appendix One: Questionnaire

1. Sex?
   Male / female
2. Have your tried to access Moodle from home?
   Yes-no problem / Yes-but have had problems / No
3. On average how often are your REQUIRED by your teachers to use Moodle outside the classroom:
   Never / less than once a month / once a month / once a fortnight / once a week / twice a week / three times a week / four times a week / five times a week / more than five times a week
4. When NOT REQUIRED by your teachers, how often do you access Moodle outside the classroom to support your learning?
   Never / less than once a month / once a month / once a fortnight / once a week / twice a week / three times a week / four times a week / five times a week / more than five times a week
5. Overall for my subjects Moodle is used:
   Not at all / very small extent / small extent / large extent / very large extent
6. To what extent do you agree or disagree with the following statements about the use of Moodle to encourage independent learning (tick one box only)

| | Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree |
|---|---|---|---|---|---|
| a. The opportunity to learn using Moodle at a time, place and pace to suit myself encourages me to learn independently | | | | | |
| b. The way in which subject/course are set up encourages me to learn independently | | | | | |
| c. Generally for my subjects the resources for me on Moodle are mainly for information purposes | | | | | |
| d. generally for my subjects the activities on Moodle encourage me to talk to other students about the work | | | | | |

7. To what extent do you agree or disagree with the following statements that the use of Moodle increase your motivation to learn (tick one box only)

| | Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree |
|---|---|---|---|---|---|
| a. The opportunity to be in control of my learning via Moodle and learn at a time, place and pace, increases my motivation to learn | | | | | |
| b. The variety of course tools eg resources, PowerPoints, quizzes, hyperlinks, news feeds, forums, available on Moodle, has increased my motivation to learn | | | | | |
| c. The variety of formats available on Moodle eg text, images, audio clips, podcasts, has increased my motivation to learn | | | | | |
| d. Feedback on activities eg assignments and quizzes on Moodle has increased my motivation to learn | | | | | |

8. To what extent do you agree or disagree with the following statements that the use of Moodle has a positive impact on your achievement (tick one box only)

| | Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree |
|---|---|---|---|---|---|
| a. Moodle has a positive impact on my effectiveness as a student | | | | | |
| b. Moodle is an important and valuable aid to me in my studies | | | | | |
| c. I can learn more with Moodle than without it | | | | | |
| d. Moodle improves the quality of my learning | | | | | |

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